AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listing, of claims in the application.

1. (Previously Presented) An apparatus for determining a propagation time delay, comprising:

at least one source adapted to generate a plurality of separable, modulated Doppler invariant signals;

at least one receiver deployed along a seismic sensing cable, wherein the receiver is adapted to receive at least one modulated Doppler invariant signal from the at least one source; and

a signal processing unit adapted to determine the propagation time delay between the source and the receiver using the modulated Doppler invariant signal and the received modulated Doppler invariant signal.

2. (Previously Presented) The apparatus of claim 1, wherein the modulated Doppler invariant signals are modulated linear-period-modulated signals.

3. (Previously Presented) The apparatus of claim 2, wherein the modulated linear-period-modulated signals have a bandwidth of about 16 kHz and a temporal duration of about 0.25 seconds.

4. (Previously Presented) The apparatus of claim 1, wherein the signal processing unit is adapted to determine the propagation time delay between the source and the receiver by cross-correlating one of the modulated Doppler invariant signals and the received modulated Doppler invariant signal.

5. (Original) The apparatus of claim 4, wherein the signal processing unit is adapted to determine the propagation time delay between the source and the receiver by auto-correlating the modulated Doppler invariant signal.

6. (Canceled)

7. (Previously Presented) The apparatus of claim 1, wherein the at least one source is adapted to generate the plurality of separable Doppler invariant signals as a plurality of orthogonal Doppler invariant signals.

8. (Original) The apparatus of claim 7, wherein the at least one source is adapted to generate the plurality of orthogonal Doppler invariant signals using a plurality of orthogonal sequences.

9. (Original) The apparatus of claim 8, wherein the plurality of orthogonal sequences are at least one of a plurality of Maximal sequences and a plurality of Kasami sequences.

10. (Currently Amended) The apparatus of claim 1 [[6]], wherein the at least one source is adapted to generate the plurality of separable Doppler invariant signals substantially simultaneously.

11. (Currently Amended) The method of claim 1 [[6]], wherein the at least one source is adapted to generate the plurality of separable Doppler invariant signals with a time delay between each of the plurality of separable Doppler invariant signals.

12. (Currently Amended) The apparatus of claim 1 [[6]], wherein the at least one source is a first source adapted to generate the plurality of separable Doppler invariant signals.

13. (Currently Amended) The apparatus of claim 1 [[6]], wherein the at least one source is a plurality of physically separate sources adapted to generate the plurality of separable Doppler invariant signals.

14. (Original) The apparatus of claim 1, wherein the signal processing unit is adapted to determine a distance between the source and the receiver using the propagation time delay.

15. (Original) The apparatus of claim 1, wherein the at least one source is deployed near the surface of a body of water.

16. (Original) The apparatus of claim 15, wherein the at least one source is deployed on at least one of a buoy, a vessel, and a towed cable.

17. (Previously Presented) A method for determining a propagation time delay, comprising:

generating a plurality of separable, modulated Doppler invariant signals using at least one source;

receiving the at least one modulated Doppler invariant signal with at least one receiver positioned along a seismic cable; and

determining at least one propagation time delay from the source to the receiver using the modulated Doppler invariant signal and the received Doppler invariant signal.

18. (Previously Presented) The method of claim 17, wherein generating the separable, modulated Doppler invariant signals comprises generating a linear-period-modulated signal.

19. (Original) The method of claim 18, wherein generating the linear-period-modulated signal comprises generating the linear-period-modulated signal having a bandwidth of about 16 kHz for about 0.25 seconds.

20. (Previously Presented) The method of claim 17, wherein determining the propagation time delay from the source to the receiver using the separable, modulated Doppler invariant signals and the received Doppler invariant signal comprises cross-correlating the modulated Doppler invariant signal and the received Doppler invariant signal.

21. (Previously Presented) The method of claim 17, wherein determining the propagation time delay from the source to the receiver using the separable, modulated Doppler invariant signals and the received Doppler invariant signal comprises auto-correlating the modulated Doppler invariant signal.

22. (Canceled)

23. (Previously Presented) The method of claim 1, wherein generating the separable, modulated Doppler invariant signals comprises generating a plurality of orthogonal Doppler invariant signals.

24. (Original) The method of claim 23, wherein generating the plurality of orthogonal Doppler invariant signals comprises generating the plurality of orthogonal Doppler invariant signals using at least one of a Maximal sequence and a Kasami sequence.

25. (Currently Amended) The method of claim 17 [[22]], wherein generating the plurality of separable, modulated Doppler invariant signals comprises generating the plurality of separable Doppler invariant signals substantially simultaneously.

26. (Currently Amended) The method of claim 17 [[22]], wherein generating the plurality of separable, modulated Doppler invariant signals comprises generating the plurality of separable Doppler invariant signals with a time delay between each of the plurality of separable Doppler invariant signals.

27. (Original) The method of claim 17, further comprising determining at least one distance from the source to the receiver using the at least one propagation time delay.